Flue gas analysis for industry

Goals

The following goals apply when measuring industrial flue gases:

Emissions monitoring

Adherence to legally specified limit values (e.g. TA Luft); meeting ISO 14000 requirements. Important parameters: NO_x ($NO + NO_2$), SO_2, CO, O_2 and in some cases CO_2.

Adjustment and optimisation of systems

This often goes together with adherence to emission limit values. Otherwise the aim here is to reduce operation costs by saving energy. Important parameters: O_2, CO, CO_2, excess air value and efficiency.

Process monitoring in thermal manufacturing procedures

What is important here is atmosphere monitoring and documentation for quality assurance purposes (ISO 9000 ff), reduction of reject numbers and costs by saving energy and cutting down on stop periods. Important parameters: O_2, CO, CO_2, SO_2.

Portable flue gas analysers from Testo

For over 16 years Testo has been manufacturing portable flue gas analysers for special industrial applications.

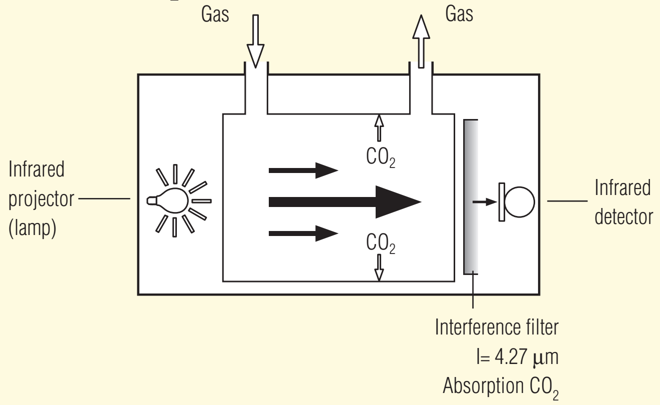
These instruments fulfill the high requirements of industry e.g.:
- High accuracy (comparable with infrared or chemiluminescence technology from stationary applications)
- Long-term measurements (practically stationary) lasting from several hours to several weeks
- Flexible range of sampling probes for the different sampling points
- High to extreme measuring ranges for use in crude gas or special oven atmospheres
- Service by the user to save on costs and reduce down times
- Not affected by dusty or moist flue gas or "tough" ambient conditions (high temperature, vibrations...)

The measurement principles

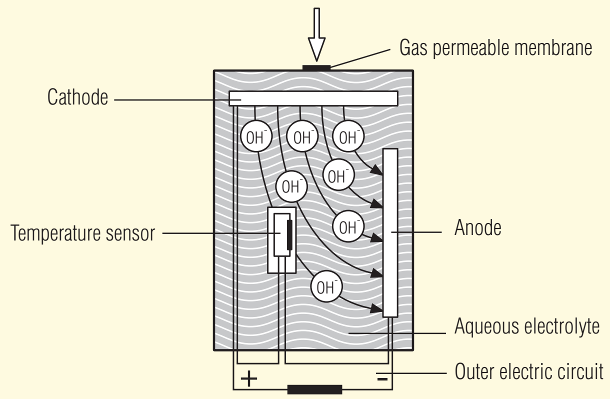
Testo uses electrochemical measuring cells for the O_2, CO, NO, NO_2 and SO_2 parameters. These sensors have major advantages for portable applications:
- Not affected by vibrations and changes in temperature
- Small dimensions and low weight
- Easy to change without test gas
- Wide measuring ranges and low zero point drift for low concentrations
- Extreme linearity over the whole measuring range

An NDIR sensor is used for CO_2.

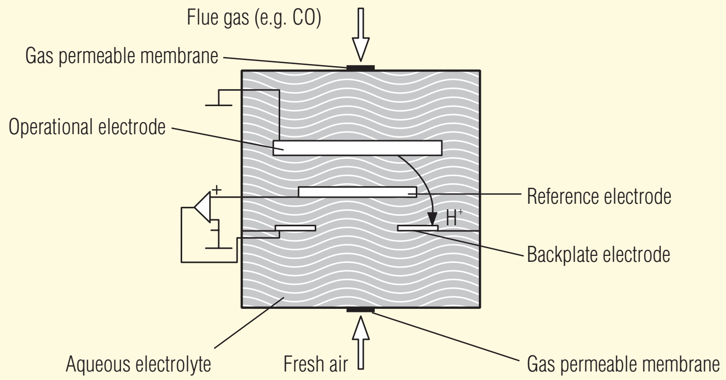
CO_2 infrared sensor



O_2 measuring cell



Measuring cell e.g. for toxic gases



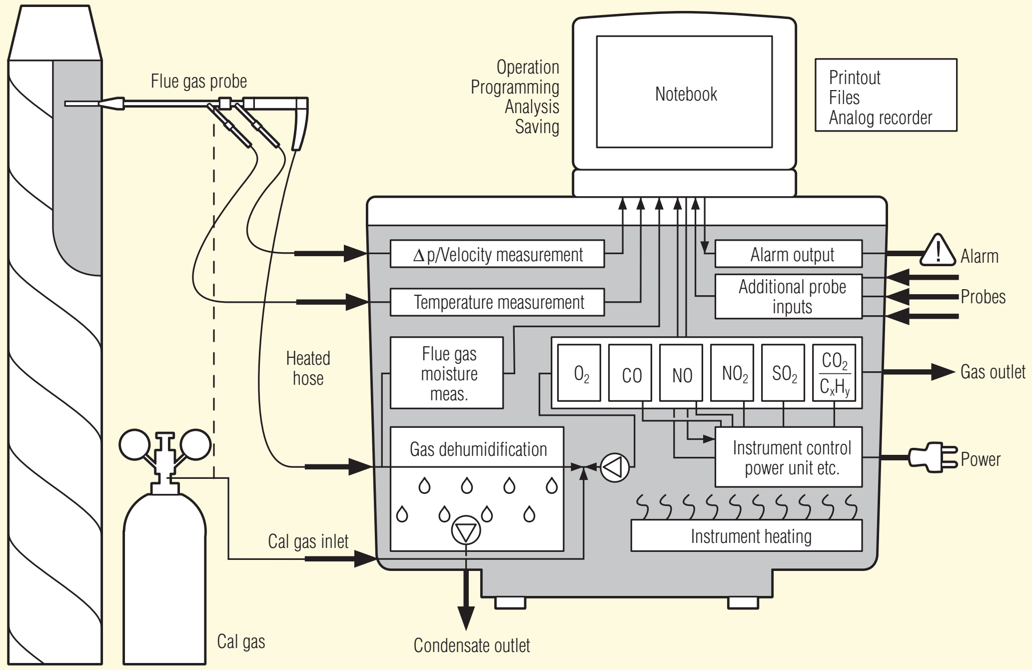
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Typical applications

Application	testo 325-I	testo 300 M-I testo 300 XL-I	testo 350 M testo 350 XL	testo 360
Oil/gas burner	CO: +	+	+	+
Coal furnace	CO: +; SO_2: +	+	+	+
Wood combustion	CO: +	0	+	+
Block-type thermal power station	NO: o	0	+	+
Steel and nonferrous	CO: +	0	+	+
Cement production	-	-	0	+
Glass industry	CO: +; SO_2: +	+	+	+
Terotechnology	0	+	+	+
Universities/Technical colleges	0	+	+	+
Burner/Boiler manufacturers	0	+	+	0
Chemical industry	+	+	+	+
Garbage incineration	-	-	0	+
Therm. post-combustion	-	+	+	+

+ = recommended
o = recommended in some cases
- = not recommended

Overview and operation (example: testo 360)



Why gas preparation?

- Condensate collection to protect the instrument
- Accurate NO_2, SO_2 measurement
- Unsupervised long-term measurement

Operation

Two physical principles:
a) Peltier cooling unit
b) Permeation dryer

Testo uses the Peltier cooling unit with the following advantages:
- Not affected by dirt and dust
- No service costs
- Lowest absorption of NO_2 and SO_2 level for exact measurements